

REMARKS

In the specification, paragraph [0039] is proposed to be amended to correct the patent number of the '518 patent. No new matter has been added.

The Final Office Action mailed September 4, 2003, has been received and reviewed. Claims 1 through 28 are currently pending in the application. Claims 1 through 28 stand rejected. Applicants propose to amend claims 1 through 3, 5 through 20 and 22 through 28, and respectfully request reconsideration of the application as proposed to be amended herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 3,801,365 to Hrzek in View of U.S. Patent No. 5,989,999 to Levine et al.

Claims 1, 8 through 13, 15 through 17, 20 and 23 through 28 stand rejected in the Final Office Action under 35 U.S.C. § 103(a) as assertedly being unpatentable over Hrzek (U.S. Patent No. 3,801,365) in view of Levine et al. (U.S. Patent No. 5,989,999). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

In the Response filed June 12, 2003, Applicants provided a discussion of the Hrzek process for forming conductive structures, including metal silicide contacts. There it was explained that although Hrzek refers to this process as a metal silicide "deposition" process, it is clear that the metal silicide is not deposited onto the silicon wafer (*i.e.*, formed above the silicon wafer), but instead is formed as a reaction occurs at the surface of the silicon wafer.

As discussed in the Response, the Hrzek process includes introducing a mixture that includes sublimated molybdenum pentachloride, hydrogen, and argon onto the surface of a heated silicon wafer. Col. 6, lines 27-47. A reaction occurs as the metal pentachloride contacts the heated silicon; purportedly the metal pentachloride gives off elemental chlorine and forms a metal subchloride. Col. 3, lines 45-49. The elemental chloride purportedly reacts with the silicon to form a silicon chloride. The silicon chloride then purportedly reacts with the metal subchloride to form the metal (*i.e.*, molybdenum) silicide. Col. 3, lines 49-53.

Applicants thus noted that the teachings of Hrzek are limited to a process that includes reacting silicon atoms at a surface of a semiconductor substrate (*i.e.*, a silicon wafer) with other reactants to form metal silicide (*i.e.*, molybdenum silicide) *at* that surface. As the metal silicide of Hrzek is formed by consuming atoms at the surface, it is clear that the metal silicide is not deposited *onto* that surface. Accordingly, Applicants submitted that independent claims 1 and 20 defined over the combination of the Hrzek and Levine references suggested in the Final Office Action.

Responding to this discussion, the Final Office Action states that “it is submitted that Hrzek clearly teach that the metal silicide 78, such as molybdenum silicide, is formed by **selectively depositing** directly onto the silicon wafer.” (Emphasis in original). Hrzek column 12, lines 19-22 and column 7, lines 10-12 are cited in support of this statement. (Final Office Action at page 9, Numbered Section 8). Applicant respectfully submits that an examination of Hrzek, including the sections cited in the Final Office Action, makes it clear although Hrzek teaches a metal silicide formed as a reaction occurs at the surface of a silicon wafer, it fails to teach a metal silicide deposited onto a silicon wafer (*i.e.*, formed above the silicon wafer).

At column 12, lines 19-22, Hrzek states that: “Thereafter conductive layer 78 of stratified metal silicides, preferably of molybdenum silicides or tungsten silicides is provided in aperture 76 by the method of the invention as described hereinbefore.” This language thus merely reflects that the metal silicide is provided in aperture 76, as described before, no specific discussion of the method of “providing” is present at this point. The earlier discussion at column 7, lines 10-12 is part of a longer passage extending to line 20, which reads:

When the molybdenum silicide layer is selectively deposited in the area of pore 64, **the layer 68 of molybdenum silicide grows, as a result of the reaction, into the silicon material extending slightly below the original level 66 of pore 64 as shown. The interface between the molybdenum silicide layer and the silicon in the underlying parts of the wafer is usually ragged and irregular,** providing for intimate, increased contact between the two phases and resulting in excellent adherence of the contact material to the semiconductor silicon. (Emphasis added).

The passages cited in the Final Office Action thus demonstrate that the Hrzek process takes place as a reaction consuming atoms at the surface of a wafer forms a metal silicide at that surface, and into that surface.

By contrast, independent claim 1 is proposed to be amended herein to recite: "depositing metal silicide **directly on top of at least one exposed, doped area of the semiconductor device structure**" (emphasis added). As demonstrated by the forgoing discussion, this claims thus contain elements not taught or suggested in Hrzek and Levine similarly fails to teach these elements. Accordingly, Applicants respectfully submit this rejection should be withdrawn. Similarly, independent claim 20 is proposed to be amended to recite: "depositing a contact material **directly on top of an exposed active device region of the semiconductor device structure**" (emphasis added). It is requested that independent claim 1, as proposed to be amended, with claims 8 through 13 and 15 through 17 dependent therefrom, and independent claim 20, as proposed to be amended, with claims 23 through 28 dependent therefrom, be allowed.

Obviousness Rejection Based on U.S. Patent No. 3,801,365 to Hrzek in View of U.S. Patent No. 5,989,999 to Levine et al., and Further in View of U.S. Patent No. 5,043,299 to Chang et al.

Claims 2 through 5, 21 and 22 stand rejected in the Final Office Action under 35 U.S.C. § 103(a) as assertedly being unpatentable over Hrzek (U.S. Patent No. 3,801,365) in view of Levine et al. (U.S. Patent No. 5,989,999), as applied to claims 1, 8 through 13, 15 through 17, 20, and 23 through 28 above, and further in view of Chang et al. (U.S. Patent No. 5,043,299). The Final Office Action states that "Hrzek in view of Levine et al. teaches the claimed method, as

stated above” but fails to teach additional elements assertedly found in Chang et al. (Final Office Action at page 5). Applicants respectfully submit that claims 1 and 20 define over the combination of Hrzek and Levine suggested in the Final Office Action, as discussed previously herein. Claims 2 through 5 are thus each allowable as depending from allowable claim 1, and claims 21 and 22 are allowable as depending from allowable claim 20.

Obviousness Rejection Based on U.S. Patent No. 3,801,365 to Hrzek in View of U.S. Patent No. 5,989,999 to Levine et al., and Further in View of U.S. Patent No. 5,162,259 to Kolar et al.

Claims 6 and 7 stand rejected in the Final Office Action under 35 U.S.C. § 103(a) as assertedly being unpatentable over Hrzek (U.S. Patent No. 3,801,365) in view of Levine et al. (U.S. Patent No. 5,989,999), as applied to claims 1, 8 through 13, 15 through 17, 20, and 23 through 28 above, and further in view of Kolar et al. (U.S. Patent No. 5,162,259). Applicants respectfully traverse this rejection, as hereinafter set forth.

The Final Office Action states that “Hrzek in view of Levine et al. teaches the claimed method, as stated above” but fails to teach additional elements assertedly found in Kolar et al. (Final Office Action at page 7). Applicants respectfully submit that claim 1 defines over the combination of Hrzek and Levine suggested in the Final Office Action, as discussed previously herein. Claims 6 and 7 are thus each allowable as depending from allowable claim 1. It is requested this rejection be withdrawn and the claims allowed.

Obviousness Rejection Based on U.S. Patent No. 3,801,365 to Hrzek in View of U.S. Patent No. 5,989,999 to Levine et al., and Further in View of U.S. Patent No. 6,087,257 to Park et al.

Claims 14, 18, and 19 stand rejected in the Final Office Action under 35 U.S.C. § 103(a) as assertedly being unpatentable over Hrzek (U.S. Patent No. 3,801,365) in view of Levine et al. (U.S. Patent No. 5,989,999), as applied to claim 1 above, and further in view of Park et al. (U.S. Patent No. 6,087,257). Applicants respectfully traverse this rejection, as hereinafter set forth.

The Final Office Action states that “Hrzek in view of Levine et al. teaches the claimed method, as stated above” but fails to teach additional elements assertedly found in Park et al.

(Final Office Action at page 7). Applicants respectfully submit that as claim 1 defines over the combination of Hrzek and Levine suggested in the Final Office Action, as discussed previously herein, claims 14, 18 and 19 are each allowable as depending therefrom. It is requested this rejection be withdrawn and the claims allowed.

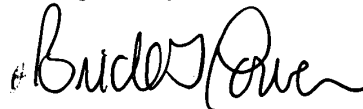
ENTRY OF AMENDMENTS

The proposed amendments to claims 1 through 3, 5 through 20 and 22 through 28 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1 through 28 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Office determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



Brick G. Power
Registration No. 38,581
Attorney for Applicant(s)
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

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